

What is claimed is:

1. A system for selectively heating and cooling samples held in solution which comprises:

5 a holding plate having a first surface and a second surface, with a plurality of substantially parallel through-hole wells extending through said holding plate between said first surface and said second surface for holding said samples in solution therein, wherein said through-hole wells are generally cylindrical and have a diameter;

10 a metallic coating positioned on said first surface and extending a distance into each said through-hole well to contact said solution in said through-hole well; and

a heat transfer device thermally connected with said metallic coating for heating and cooling said solution and said sample.

2. A system as recited in claim 1 wherein said distance into each 15 said through-hole well is at least equal to approximately one and one half said diameters.

3. A system as recited in claim 1 further comprising a metallic coating positioned on said second surface and extending approximately said distance into each said through-hole well to contact said solution in said 20 through-hole well.

4. A system as recited in claim 1 further comprising a cap member, said cap member being dimensioned for engagement with said holding plate to cover said first surface thereof and protect said solution from ambient environmental conditions.

25 5. A system as recited in claim 1 wherein said metallic coating is positioned using vapor deposition techniques.

6. A system as recited in claim 1 wherein each said through-hole well has an aspect ratio greater than 5:1 and said diameter is less than approximately five hundred microns.

7. A system for selectively heating and cooling a sample which  
5 comprises:

10 a holding plate having a first surface and a second surface, and at least one through-hole well for holding said sample therein, wherein said through-hole well has a diameter of approximately five hundred microns, and further wherein said through-hole well has an aspect ratio greater than 5:1;

15 a thermal conductor positioned on said first surface and extending a distance into said through-hole well to contact said sample in said through-hole well wherein said distance into each said through-hole well is equal to approximately one and one half said diameters; and

a heat transfer device thermally connected with said thermal conductor for heating and cooling said sample.

8. A system as recited in claim 7 wherein said holding plate has a plurality of substantially parallel said through-hole wells extending through  
20 said holding plate between said first surface and said second surface for holding said sample therein.

9. A system as recited in claim 7 wherein said thermal conductor is a metallic coating.

10. A system as recited in claim 9 wherein said metallic coating is  
25 Nichrome.

11. A system as recited in claim 10 further comprising a metallic coating positioned on said second surface and extending approximately said distance into each said through-hole well to contact said sample in said through-hole well.

5 12. A system as recited in claim 10 wherein said metallic coating is positioned using vapor deposition techniques.

13. A system as recited in claim 7 further comprising a cap member, said cap member being dimensioned for engagement with said holding plate to cover said first surface thereof and protect said solution from ambient  
10 environmental conditions.

14. A method for selectively heating and cooling samples held in a solution which comprises the steps of:

15 placing said samples in a plurality of substantially parallel through-hole wells of a holding plate, said holding plate having a first surface and a second surface, wherein said plurality of through-hole wells extends through said holding plate between said first surface and said second surface for holding said samples in said solution therein, wherein said through-hole wells are generally cylindrical and have a diameter, and further wherein said holding plate has a metallic coating positioned on said first surface and extended a distance of approximately one and a half diameters into each said through-hole well; and  
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25 activating a heat transfer device, wherein said heat transfer device is thermally connected with said solution and said sample through said metallic coating.

15. A method as recited in claim 14 wherein said holding plate includes a metallic coating positioned on said second surface and extended a distance into each said through-hole well to contact said solution in said through-hole well.

5           16. A method as recited in claim 15 wherein said distance into each said well is at least equal to approximately one and one half said diameters.

10         17. A method as recited in claim 14 further comprising the step of covering said holding plate with a cap member to protect said solution from ambient environmental conditions, said cap member being dimensioned for engagement with said holding plate.

18. A method as recited in claim 14 wherein each said through-hole well has an aspect ratio greater than 5:1 and said diameter is less than approximately five hundred microns.

19. A method for manufacturing a heat transfer system to heat and cool a sample which comprises the steps of:

- providing a holding plate having a first surface and a second surface, and at least one through-hole well for holding said sample therein, wherein said through-hole well has a diameter of approximately five hundred microns, and further wherein said through-hole well has an aspect ratio greater than 5:1;
- coating said first surface of said holding plate with a metallic coating, wherein said metallic coating extends a distance of at least approximately one and a half diameters into said through-hole well;
- selectively coating said second surface of said holding plate with said metallic coating, wherein said metallic coating extends a distance of approximately one and a half diameters into said through-hole well; and
- interconnecting a heat transfer device with said sample in said through-hole well through said metallic coating.

20. A method as recited in claim 19 wherein said coating step is accomplished by vapor deposition techniques.